Shiraz E-Med J. 2016 January; 17(1):e29200. doi: 10.17795/semj29200.

Published online 2016 January 27. **Research Article**

The Effect of Complex Decongestive Therapy on Post-Breast Surgery Quality of Life in Breast Cancer Patients With Unilateral Lymphedema and Its Predictive Factors

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Received 2015 May 01; **Revised** 2016 January 12; **Accepted** 2016 January 14.

Abstract

Background: Complex decongestive therapy (CDT) is one of the most common treatments used in lymphedema. Effects of lymphedema treatment and its predictive factors were studied previously but its impact on quality of life (HRQOL) is still unknown.
Objectives: This study, in addition to investigating CDT effects on HRQOL, examined factors that can influence it, to estimate the effect of treatment according to patient's condition in our setting.
Patients and Methods: The present study was a quasi-experimental study on health-related HRQOL. A general data gathering form was used in 120 patients who developed lymphedema following breast cancer surgery and referred for treatment to Shiraz Motahari clinic in 2014. All patients' arm size was measured by "direct voltmeter" before the intervention to determine the grade of lymphedema. SF-36 questionnaire was used pre- and one month post-intervention to collect HRQOL data. Complete decongestive therapy (CDT) with or without Pump was used as the intervention.
Results: Patients had higher scores after treatment in all subscales of quality of life (except for "role limitation due to physical problems"), but a statistically significant difference (P = 0.023) was observed only in the "mental health" subscale. The results showed significant changes in bodily pain after the intervention in patients less than 40 years old (P = 0.03), "general health" and "vitality" in single patients (P values equal to 0.013 and 0.02, respectively) and "mental health" in those with education "less than high school" (P = 0.018). In the case of household patients, only PF changed significantly after treatment (P = 0.027). Moreover, "role limitation due to physical problems" and "mental health" subscales changed significantly after treatment with CDT + Pump (P values equal to 0.004 and 0.003). Other groups represented no significant changes in other subscales. Besides, duration of lymph edema had no effect on improvement of HRQOL after treatment.
Conclusions: Although this study showed that some factors can improve patients' feeling and HRQOL after treatment in our population, in many aspects no changes were observed. It is recommended to improve patients' HRQOL through more social and physiological support in our setting. Also, more follow-up duration after the intervention is recommended in future studies.

Keywords: Breast Cancer, Lymphedema, Complex Decongestive Therapy, Quality of Life

1. Background

Globally, breast cancer is the leading cause of death in women (1). Upper limb lymphedema is one of the most serious and long lasting complications of breast cancer surgery and radiotherapy with an incidence of 2.7% to 62%. Although this incidence has been reduced due to decline in radical mastectomy procedure and improvement in radiotherapy quality, this is still an important complication (2). Prevalence of chronic lymphedema (over three months) reported to be about zero to 16.8% after sentinel lymph node biopsy and 7.1% to 56% after axillary lymph node dissection (3). It is believed that true prevalence is much higher, but absence of standard criteria for diagnosis and much more concern about life-threatening breast cancer associated with lymphedema lead to its under-reporting (2). This condition can occur long after the initial treatment of breast cancer. Lymphedema symptoms include swelling, pain, tenderness, elbow flexor and shoulders abductor muscle weakness, upper limb heavy sensation, stiffness and ulceration (3, 4). There are several methods for the treatment

of lymphedema aiming to reduce the limb edema using medical and physical therapeutic methods. Several physical interventions are used including limb elevation, massage, exercise and use of external pressure or a combination of the above methods (3). Complex decongestive therapy (CDT) is one of the most common treatments used in lymphedema. This treatment has four components including education on skin care to prevent infection, manual lymphatic drainage for improving the lymph drainage, non-elastic bandaging to maintain decreased edema by elevating the tissue pressure and special exercise therapy to accelerate drainage of lymph fluid by muscle contraction and increase the range of motion in the joints (5). A comparison between CDT alone, or in combination with intermittent pneumatic compression (IPC) demonstrated that both treatments can significantly reduce the volume of limbs with best results associated with CDT alone (6). Some predicting factors for efficacy of CDT have been mentioned, such as duration of lymphedema and initial lymphedema volume (7). Postoperative breast cancer lymphedema can significantly change health-related quality of life (HRQoL) since it is known to have a significant impact on physical, psychological and social health of patients (8). In addition to reduction of quality of life, lymphedema can affect different lifestyle dimensions including physical, functional, business and economy (9). It has been shown that lymphedema and related symptoms cause time off work in more than 80% of individuals (4). Although conservative breast cancer surgery has recently improved body image and HRQoL (10), lymphedema can obviously influence them post-surgery (11). A study demonstrated that CDT significantly improved several aspects of quality of life including physical functioning, role-physical, mental health and general health (12). Effects of CDT on improvement of HRQoL and its relationship to the stage of disease, age and presence of comorbidities were studied by Park et al. (11) it was revealed that age was correlated with upper extremities' function and HRQoL was influenced by the cancer stage. Although most studies concluded that CDT can improve HRQoL (8, 11, 12), few studies were conducted on this issue in our country. Moreover, factors that can affect this association are not clearly understood. An Iranian study was conducted on the effect of treatment on quality of life in patients with breast cancer treatment-related lymphedema. It demonstrated significant improvement in physical and social aspects of quality of life as well as pain sensation (13).

2. Objectives

In the present study, in addition to investigating CDT effects on different aspects of HRQoL, we examined some factors including socio-demographic ones that can influence them. This would allow us to predict the effect of treatment according to the patient's condition in our setting.

3. Patients and Methods

The present study was a quasi-experimental study on health-related quality of life, before and after treatment, in patients with lymph edema following surgery for breast cancer; the study was performed in Motahari clinic, affiliated to Shiraz University of Medical Sciences. All patients who met the eligible criteria and referred to the center from June 2013 to May 2014 were included in the study. Patients were included if they had breast cancer-related lymph edema (diagnosed by a surgeon, gynecologist, radiotherapist or chemotherapist) who referred to the clinic for the first time to receive appropriate treatment and could understand and speak in Persian language. Exclusion criteria were as follows; lymph edema for other reasons, such as trauma, burns, regional lymph nodes injuries, a history of mental disorders, not completed treatment course, not interested in participating in this study, relapsed disease and bilateral lymph edema. We used a questionnaire for data gathering. The first part included demographic variables such as age, marital status, sex and jobs. Patients were categorized in five age groups "under 30 years", "31 - 40 years", "41 - 50 years", "51 - 60 years" and "over 60 years". Also, clinical characteristics variables included the stage of disease, radiotherapy, chemotherapy, type of breast cancer surgery and duration and type of treatment for lymph edema. History of physical activity was defined as regular physical exercise at least twice a week of moderate-intensity with heart rate increases to higher than upper limit of normal (14). The second part of questionnaire contained questions about quality of life. For this purpose, we used a validated international questionnaire SF-36 (15). The questionnaire consisted of 36 items in 8 subscales and assessed the quality of life in two general sections; physical condition status (PCS) and mental condition status (MCS). physical condition status (PCS) included physical functioning (PF), role limitation due to physical problems (RP), bodily pain (BP), general health (GH) and mental condition status (MCS) including vitality and joy (VT), social functioning (SF), RP subscale due to emotional problems (RE) and mental health (MH). In all subscales, the scores of questions were from zero to 100, so that the score for the worst condition was zero and that for the best condition was 100. We used the Persian translation of the questionnaire (SF-36), which its validity and reliability had been previously examined and approved (16). The third part was exactly the same as the

second part of questionnaire and completed after the intervention. For gathering data, we explained the project's benefits and methods for patient and if he or she agreed to participate in this study, a questionnaire (first and second part) was completed by the interviewer (face to face). Filling the third part of questionnaire was conducted one month after the last treatment session. To measure the grade of lymph edema, before the intervention, and diagnosis of size difference, we used "direct voltmeter" device. The total volume of device used in this study was 6 liter with cross-sectional area of 320 square centimeters. The grade of lymphedema was determined by a physiotherapist, using the difference between the two extremities' displacement of liquid in the device. Complete decongestive therapy (CDT) was selected as the intervention in this study. CDT has four steps; manual lymph drainage (MLD), skin and nail care (self-care), range of motion exercises and compression (bandaging). Necessary self-care information was given by a physiotherapist. The duration of intervention was determined according to the grade of lymph edema. If the size difference between two arms was below 20% (grade 1), the intervention continued for 2 weeks. If the size difference was 20% - 40% (grade 2) or over 40% (grade 3) the intervention lasted 4 or 6 weeks respectively. We used the statistical software SPSS, version 15. Paired t-test, t-test and Pearson correlation coefficients were used for analyzing data. $P < 0.05$ was considered as significance level.

4. Results

In total, 120 patients with lymphedema (following breast cancer surgery) participated in this study, consisting of 118 women and 2 men. Men were excluded due to small number, so 118 patients participated. The participants' age range was 20 - 80 years with a mean of 56.51 ± 9.97 years. Age group of less than 30 years old had just one participant, so this group was merged with the age group 31 - 40 years (Group I). For easier data analysis on marital status, single, divorced or widowed were merged in one group due to low number in each group (Group I) (Table 1).

Distribution of patients according to the study variables is summarized in Table 2. The results showed that patients in all subscales of quality of life had higher scores after treatment (except for RP), but only in the "MH" subscale, a statistically significant difference was observed (Table 3). Regarding demographic variables (Table 3), no significant improvement was found in most subscales of HRQoL after treatment except for BP in 31 - 40 years old patients ($P = 0.036$), MH in the group with education "less than high school" ($P = 0.018$) and PF in unemployed patients ($P = 0.027$). Also GH and VT were improved significantly in single patients (P values 0.013 and 0.02, respectively). As clinical characteristic variables (Table 4), "PF" and "MH" subscales improved in patients who received radiation therapy ($P = 0.048$ and $P = 0.02$ respectively), SF subscale improved significantly in the tumor stages II and III ($P = 0.026$ and $P = 0.039$, respectively), and PF changed significantly after the intervention in patients with lymphedema grade III (Table 4). Moreover, RP and MH subscales changed significantly after the treatment with CDT + Pump, but patients' HRQOL did not change after CDT. Other subscales of HRQoL did not show any significant correlation with other patients' clinical characteristics.

Table 1. Demographic Data

Variable	No. (%)
Educational level	
Before diploma	73 (61.9)
Over high school	45 (38.1)
Total	118 (100)
Marital status	
Single	20 (16.9)
Married	98 (83.1)
Total	118 (100)
Employment status	
Unemployed	102 (86.5)
Employed	13 (11)
Unanswered	3 (2.5)
Total	118 (100)

5. Discussion

Breast cancer related lymphedema has great complications such as thick and painful arm, swelling in the affected limb, delayed wound healing, fibrosis and skin infections in the area with lymphedema and can cause undesirable physical condition and HRQoL. This study aimed to determine the effect of CDT treatment on quality of life in patients with lymphedema following breast cancer treatment. The results showed that single patients had better GH and VT than the married ones. Unemployed and less educated cases had better PF and MH HRQoL respectively than their counterparts. In terms of clinical characteristics, only PF, MH and SF improved in patients with a history of radiotherapy, chemotherapy and tumor stages of II and III, respectively. Only CDT with and without Pump had a significant influence on RE and MH subscales. Although

Table 2. Distribution of Patients According to the Study Variables

Variable	No. (%)
Stage of disease	
Stage 1	18 (15.3)
Stage 2	56 (47.5)
Stage 3	17 (14.4)
Unanswered	27 (22.9)
Total	118 (100)
Type of surgery	
Conservative	20 (16.9)
MRM	95 (80.5)
Unanswered	2.5
Total	118 (100)
History of radiotherapy	
Yes	100 (84.7)
No	18 (15.3)
Total	118 (100)
History of chemotherapy	
Yes	115 (97.5)
No	2 (1.7)
Unanswered	1 (0.8)
Total	118 (100)
Lymph edema grade	
1	3 (2.5)
2	32 (27.1)
3	83 (70.3)
Total	118 (100)
Type of treatment	
CDT	68 (57.6)
CDT + Pump	50 (42.4)
Total	118 (100)

Table 3. Comparison of the Scores of HRQOL Subscales Before and After the Intervention[a]

Subscales of HRQOL	Before Intervention	After Intervention	P Value
Physical functioning	53.60 (29.33)	58.26 (26.11)	0.054
Physical role	19.06 (36.20)	18 (34.10)	0.807
Bodily pain	49.49 (25.68)	52.71 (24.13)	0.219
General health	57.28 (22.62)	61.14 (22.54)	0.089
Vitality	56.56 (18.20)	58.81 (17.59)	0.166
Social functioning	67.37 (32.11)	72.56 (28.46)	0.120
Role-emotional	41.24 (49.05)	45.76 (47.89)	0.379
Mental health	58.94 (19.35)	62.50 (17.37)	0.023

[a]Values are expressed as mean (SD).

the scores indicated a better quality of life after treatment in all subscales (except physical role functioning), only MH aspect improved significantly. Kim et al. (12) showed that self-reported PF, RF, MH and GH subscales were significantly changed by CDT intervention. Except for MH, these results are incompatible to ours, perhaps due to long-term follow-up (for 6 months) and longer maintenance phase in Karlsson et al. (17). As subjects were confident that CDT can improve their edema, they became more hopeful so MH improved much sooner than other aspects. However, it was demonstrated that in longer follow-up period (15 years), no significant difference existed in HRQoL between patients who continued and did not continue treatment of lymphedema. Weiss and Spray (18) also reported that CDT can increase the PF score. Although in our study no significant change in this aspect was detected, subjects expressed that they had less difficulty with moderate activities such as moving a table, vacuum cleaner transportation and sports style, also in heavy activities such as running, lifting heavy objects and participating in sports activities after treatment. The mean score in RP decreased after treatment. It means that subjects accomplished less than they liked. It is incompatible with the results of a previous study (11) probably because our patients did not know how much they must expect of themselves. They cannot cope with their problem, especially in a short period of 1 month, because of low relationship between physicians and nurses with patients. They had no imagination about their condition and their disease prognosis. This may improve by holding consultation sessions to completely explain the situation for patients and help them to cope with their disease in earlier stages. Our study demonstrated that BP subscale improved significantly by treatment in younger patients (group 1), but not in older ones. This is somehow compatible with Park et al. (11), which reported lower upper extremities' function in older patients after CDT. But it is incompatible with Dayes et al. (19) regarding the effect of CDT in peripheral lymphedema including lower extremity edema. In addition to the difference in subjects of our study and those of Dayes, perhaps this incompatibility is because of our small sample size in each age group. Marital status also showed a significant association with VT and GH scales in such a way that single subjects experienced more improvement in emotion than married ones. In contrast, Haghighat et al. (7) reported that marriage status had no

Table 4. Effects of Patient's Clinical Characteristic on HRQoL Subscales Change After Lymphedema Therapy

Study Variables	SF-36 Scales							
	Physical Functioning	Physical Role	Bodily Pain	General Health	Vitality	Social Functioning	Role Emotional	Mental Health
Radiotherapy								
Yes	0.048	0.92	0.39	0.06	0.19	0.14	0.62	0.02
No	0.85	0.58	0.21	0.75	0.62	0.65	0.37	0.72
Chemotherapy	0.50	0.71	0.54	0.32	0.23	0.12	0.14	0.03
Grade of tumor								
I	0.47	0.25	0.56	0.35	0.65	0.22	0.8	0.83
II	0.1	0.55	0.09	0.12	0.68	0.026	0.27	0.12
III	0.64	1	1	0.76	0.66	0.039	0.163	1
Grade of lymph edema								
I	-	-	-	-	-	-	-	-
II	0.98	0.44	0.95	0.35	0.43	0.31	0.33	0.22
III	0.025	0.31	0.16	0.21	0.37	0.27	0.70	0.09
Type of treatment								
CDT + Pump	0.62	0.67	0.81	0.35	0.11	0.098	0.004	0.003
CDT	0.32	0.62	0.15	0.16	0.59	0.55	0.30	0.48
Surgical type								
Conservative	0.89	0.47	0.95	0.94	0.44	0.57	0.62	0.15
MRM	0.07	0.86	0.22	0.56	0.23	0.16	0.35	0.1
Duration of lymph edema	0.20	0.69	0.41	0.38	0.41	0.16	0.66	0.50

Abbreviations: CDT: complete decongestive therapy, MRM: modified radical mastectomy, NS: not significant statistical difference.

significant effect on reduction of volume of the limb. Probably, this incompatibility is due to improvement in energy and emotion mostly related to coping function rather than real improvement in the body status and function. As Montazeri et al. (16) showed, HRQOL improvement was not necessarily correlated with reduction of volume of the limb. Perhaps single subjects better cope with their problems, because they are less worried about others peoples' judgment (such as their husband or his family). Also, education level less than high school had a significant association with MH subscale of HRQOL. The reason could be that people with higher education have higher expectations in their life, which are largely limited by the disease. No association was observed between the level of education and reduction in volume of limb after treatment in Haghighat et al. study (7). Based on the results, unemployed subjects showed a significant improvement in PF (such as personal tasks, chores, walking over a kilometer, climbing stairs and carrying objects). But no significant changes in the HRQOL subscales were seen after intervention in the employed female group. Perhaps, the reason is the social role of employed women as a protective factor for their physical function and maybe PF subscale in this group was better before the intervention than unemployed ones. However, it is in contrast to Quere et al. (20) which demonstrated that activity status (working/retirement/housewife) was not a significant predictive factor of response (volume reduction) to intensive therapy of lymphedema and also Haghighat et al. study which showed no difference between employed and unemployed patients in the reduction of arm volume after CDT. As far as we reviewed the literature, no study was found to demonstrate the effect of occupation on QOL.

These differences may be because QOL is influenced more by psychological than physical status of patients. Overall, single patients, unemployed and less educated cases were better at least in some aspects of HRQoL than married, employed and educated ones, respectively. Perhaps it is because they have to use their affected painful hands. According to results, no improvement in HRQOL after treatment was observed in patients with a history of physical activity. In spite of a significant negative correlation between weight gain and arm volume after treatment (21), these results were obtained after a long-term follow-up. Therefore it is not unexpected that physical activity cannot affect treatment in one month period. Perhaps if the patients exercise for improving limb function, positive effects on quality of life would be observed. This has been approved by Gautam et al. (22). As mentioned in the results, patients with grade III lymphedema showed no significant improvement in subscales of HRQoL after treatment except for PF. It was hypothesized that objective symptoms such as LVC (limb volume change) would respond more significantly to treatment at low grade lymphedema than higher grade (23). In our study, most patients had moderate to high grade lymphedema and just a few low grade patients with lymphedema were present to be evaluated. PF improvement in the present study, as other studies showed (24, 25) is not significantly related to HRQoL. So improvement in PF and HRQOL after treatment of lymphedema must be evaluated from different aspects (11). These results are somehow consistent with those of the study by Dayes et al. (19), which showed no significant association between HRQOL and grade of lymphedema. Park et al. (11) as well as the present study found no association between radiotherapy, chemotherapy or type of surgery and most subscales of HRQoL. In study of Park et al. chemotherapy was associated with pain (11); this is inconsistent with our findings. Perhaps, it is because of different chemotherapy and analgesics used in the two studies. Also, in examining HRQOL based on the stage of tumor, an improvement of SF after the intervention was observed in stages two and three of breast cancer in our study, which is incompatible with the result of park's study. This may be caused by sociocultural differences between the two study populations. In our country, patients with severe disease receive more support by their families and community, which might explain improved SF in more severely ill patients in our study. The optimal effect of CDT + Pump on reducing the volume of arm or increasing the range of motion in the affected joint has been demonstrated (6, 26). Some studies compared combined CDT + Pump with CDT alone in reducing the arm volume. In a study with larger sample size, CDT alone was superior to CDT with Pump in 3 month follow-up period (6). In the present study with a shorter period of follow-up (1 month), no significant difference was observed between these two methods in most HRQoL subscales. The exceptions were MH and RE, which were proved to be better in the combined method. Independence of subjective effects (HRQoL) from objective ones, such as arm volume reduction, may be a reason for this discrepancy. The other reason can be shorter duration of follow-up in our study. Our study showed that the duration of lymphedema had no significant effect on any HRQOL subscales after the treatment. This result is consistent with those obtained by Pusic et al. (8). The limitations of the present study were its short follow-up period and no control group to be compared with the subjects. But this study had a relative great sample size in comparison with most other similar studies. It also evaluated probable predicting factors for HRQOL after CDT, which were less studied before. Moreover HRQOL is a cultural issue that is less studied in our country, especially in areas such as lymphedema and CDT intervention. This is an important subject that should be further evaluated. In future studies we recommend to follow-up larger sample of patients for longer period after intervention and compare them with a control group.

5.1. Conclusion

Overall, mental health was significantly improved after CDT in the present study. Also, single, unemployed and less educated patients were better at least in some aspects of HRQoL than married, employed and educated ones, respectively. Other aspects of HRQoL may significantly change if physicians and nurses provide more psychological support and request psychiatric consultations for patients and their families to increase their social support. Moreover, there is a significant difference between CDT with and without Pump in the RE and MH subscales of HRQoL. Longer follow-up period can highlight the differences more clearly.

Acknowledgments

This manuscript was extracted from the thesis of Maryam Abdinejad, approved by the proposal number 7037 by Shiraz University of Medical Sciences. The authors thank health policy research center, Shiraz University of Medical Sciences for funding this research. We also thank Nasrin Shokrpour for editing the English version.

Footnotes

Conflicts of Interest: All authors reported no conflicts of interest relevant to this article.

Funding/Support: Health policy research center financially funded and supported this research.

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